PB-227 770

WATER POLLUTION SURVEILLANCE SYSTEM. REPORT ON REFERENCE SAMPLE TYPE I, BD-8

Robert A. Taft Sanitary Engineering Center
Cincinnati, Ohio

1964

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PB 227 770

Water Pollution Surveillance System

REPORT ON
REFERENCE SAMPLE
TYPE 1, BD-3

1964

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Water Quality Section 1014 Broadway Cincinnati, Ohio

REFERENCE SAMPLE TYPE 1-BD-8

Report of a study conducted by the

PHS WATER POLLUTION SURVEILLANCE SYSTEM

FOREWORD

This report is the final summary of standard sample Type 1, BD-8, the twelfth sample distributed during the past several years to agencies participating in the PHS Water Pollution Surveillance System.

The primary purpose of the standard sample program is to assist the Water Quality Section in providing assurance of the reliability of data received from participating agencies. From the comments received and the interest displayed in this program it is obvious that many groups are using the sample as a means of evaluating their procedures and techniques, even in locations where analytical needs are limited. The result of this activity has not only helped to improve the quality of data obtained by the Surveillance System but has also been instrumental, to some extent, in furthering the capabilities of the cooperating agencies. We are indeed gratified by the interest shown in the standard sample program.

We would like to emphasize again that when help with laboratory procedures is needed, the staff of the Water Quality Section is ready to assist in whatever way possible.

Your cooperation is deeply appreciated.

Robert C. Kroner

ACKNOWLEDGMENTS

The preparation and distribution of the sample used in this study and writing of the final report was performed by the staff of the Analytical Reference Service at the Robert A. Taft Sanitary Engineering Center in cooperation with the General Services Laboratory of the Water Pollution Surveillance System.

The work of the following staff members of the Analytical Reference Service is gratefully acknowledged.

F. S. Kelso, Chief
R. J. Lishka, Chemist
J. M. Matthews, Chemist
J. A. Bell, Statistician

PARTICIPANTS IN STUDY OF

SAMPLE TYPE 1, BD-8

(Distributed January 1964)

Station	Participating Agency	State
Addison	Kyger Creek Electric Corporation	Ohio
Bismarck	Bismarck Filtration Plant	North Dakota
Bonneville	Crown Zellerbach Corporation	Washington
Boulder City	Boulder City Filtration Plant	Nevada
Buffalo	Erie County Health Department	New York
Chattanooga	City Water Company	Tennessee
Chattanooga	TVA Environmental Hygiene Laboratory	Tennessee
Cincinnati	Cincinnati Water Department	Ohio
Columbus	Columbus Water Department	Georgia
Delta	State Department of Health	Mississippi
Detroit	Water Works Park Filtration Plant	Michigan
Duluth	Water Gas and Sewage Department	Minnesota
El Paso	El Paso Filtration Plant	Texas
Enfield Dam	State Water Resources Laboratory	Connecticut
Evansville	Evansville Water Department	Indiana
Farad	Department of Water Resources	California
Gary	Gary-Hobart Water Corporation	Indiana
Great Falls	Dalecarlia Filtration Plant	Washington, D. C.
International Falls	Minnesota and Ontario Paper Company	Minnesota
Kansas City	Board of Public Utilities	Kansas
Lanett	West Point Manufacturing Company, Service Division	Alabama
Laredo	Laredo Water Department	Texas
Little Rock	Water Pollution Control Commission	Arkansas
Lock and Dam #3	Minnesota-St. Paul Sanitation District	Minnesota
Louisville	Louisville Water Company	Kentucky
Martins Creek	Martins Creek Steam Electric Station	Pennsylvania

Station	Participating Agency	State
Massena	Chevrolet Motor Division	New York
Milwaukee	Milwaukee Water Department	Wisconsin
New Harmony	State Board of Health	Indiana
New Orleans	State Board of Health	Louisiana
North Augusta	North Augusta Filtration Plant	South Carolina
Omaha	Metropolitan Utilities District	Nebraska
Peoria	Peoria Water Company	Illinois
Philadelphia	Philadelphia Water Department - Torresdale	Pennsylvania
Philadelphia	Philadelphia Water Department - Schuylkill	Pennsylvania
Pittsburgh	Pittsburgh Filtration Plant	Pennsylvania
Plattsmouth	State Department of Health	Nebraska
Ponca City	Ponca City Filtration Plant	Oklahoma
Port Huron	Port Huron Water Plant	Michigan
Poughkeepsie	IBM Water Plant	New York
Richland	Richland Sewage Treatment Plant	Washington
Sault Ste. Marie	Sault Ste. Marie Water Department	Michigan
Sayre	Sayre Water Company	Pennsylvania
Sidney	Montana-Dakota Utilities Company	Montana
Sioux Falls	Sioux Falls Sewage Treatment Plant	South Dakota
St. Joseph	St. Joseph Water Company	Missouri
St. Louis	St. Louis County Water Company	Missouri
St. Louis	St. Louis Water Division	Missouri
Vicksburg	State Board of Health	Mississippi
Washington, D. C.	District of Columbia Sewage Treatment Plant	Washington, D. C.
Wawawai	Washington State University	Washington
West Memphis	Light, Gas and Water Division	Tennessee
Williamsport	Hagerstown Water Department	Maryland
Winfield Dam	Division of Water Resources	West Virginia

INTRODUCTION

Much of the physical and chemical data accumulated by the PHS Water Pollution Surveillance System are the result of the cooperative efforts of many laboratories located at or near the sampling sites. Because these analyses originate from so many different sources, it is essential that they be comparable as to accuracy. The reference sample technique is a means by which this objective can be achieved. Reference samples are submitted periodically to each of the cooperating laboratories to assure continued accuracy of the data submitted. These samples also provide an opportunity for the participating laboratories to evaluate their own procedures and techniques, and to disclose unsuspected errors.

REPORT ON THE REFERENCE SAMPLES

TYPE 1, BD-8

Sample Type 1, BD-8 is the eighth in a series of standard samples representative of the mineral analyses being reported to the Water Pollution Surveillance System. Sixty-four laboratories received this sample and 54 have reported in time to have their results included in this report.

Most laboratories have little or no difficulty in performing these examinations, as shown by the general excellence of the results. However, a few grossly erroneous results were submitted, which probably were due to errors in calculation or measurement of sample volume. These results are shown on the bar charts by broken bars and were not used in the statistical evaluation.

The average result reported by each laboratory is presented in Table 2, and in the bar charts. The dotted lines on the charts represent limits of accuracy for this sample which are acceptable to the program. These limits are presented in Table 1 and were selected by considering the accuracy with which each test can be performed, as determined by "Standard Methods," as well as the needs of the program. Due consideration was given to the concentration level and the number of significant figures requested in the result. For example, total phosphate was to be reported to the nearest tenth of a milligram per liter, and only 0.4 milligrams per liter were present in the sample. This means

that the minimum error that could be reported, other than zero, would be 0.1 mg/l or 25%. Obviously, this had to be the acceptable limit even though a 25% error ordinarily would be considered poor accuracy.

Table 1. ACCEPTABLE LIMITS OF ACCURACY

	Standard Methods	Water Pollution Surveillance System
Chloride	± 1.0 mg/l	± 2.0 mg/l
Alkalinity (as $CaCO_3$)	± 2.0 mg/l	± 10.0 mg/l
Total Hardness (as $CaCO_3$)	± 2.0 mg/l	± 10.0 mg/l
Color	--	± 5.0 units
Turbidity	--	± 10.0 units
Sulfate	± 10%	± 15.0 mg/l
Total Phosphate	± 2%	± 0.1 mg/l
Total Dissolved Solids (TDS)	± 10 mg/l	± 20.0 mg/l

In most cases, those laboratories falling outside the acceptable range were notified and requested to review the procedures used in order to determine the reasons for the discrepancies. Assistance on laboratory procedures is available to the Surveillance System laboratories from the Public Health Service, through its Regional Offices or the Water Quality Section 1014 Broadway, Cincinnati, Ohio 45202.

DISCUSSION OF RESULTS

Statistical comparisons in this report were developed from the deviations from the amounts known to be present in the sample. These amounts were verified by the Analytical Reference Service laboratory. In the cases where the results deviated slightly from the theoretical, the analytical results were considered to more accurately reflect the amount present since slight losses are possible due to adsorption and other causes.

The "standards of accuracy," allowable for the Surveillance System, are intended only as a guide to the cooperating laboratories and are not to be considered as the ultimate goal in the achievement of laboratory accuracy.

No accuracy values are given by "Standard Methods" for the measurement of turbidity or color because these are subjective tests. Results depend on the analyst's ability to perceive and compare subtle difference in color or light transmission, making absolute values difficult to obtain.

Laboratories reporting values outside the range of acceptability should investigate their procedures for sources of error.

1. Have samples been well mixed to assure that true aliquots are taken?

2. Have standard solutions been checked recently?

3. Are the reagents too old?

4. Are sample sizes adequate for maximum accuracy?

5. Are weighings being made carefully?

6. Are standard curves being checked frequently?

Although most of these tests are simple and "routine," a thorough review of the details in each procedure may disclose errors which have become habitual and escape unnoticed during routine operations.

CHLORIDE - 28 mg/l

Of the 48 laboratories that reported this analysis, 32 submitted results within the acceptable limits. Seven results were within twice the acceptable limits, and three were discarded because of apparent gross errors in measurement or calculation. Although the mean and median values are 1.0 mg/l higher than the true value, 10 perfect results were submitted. The better half of the results were within ± 2.0 mg/l of the true value and the average deviation was only 2.2 mg/l.

Considering the complexity of the sample, the results are excellent.

SUMMARY OF RESULTS

Amount present	28 mg/l
Mean	29 mg/l
Median	29 mg/l
50% range	± 2 mg/l
Number of analyses	48
Average deviation from amount present	2.2 mg/l
Range	17-35 mg/l

COMPARISON WITH PREVIOUS SAMPLE

Percent Labs Within Acceptable Limits

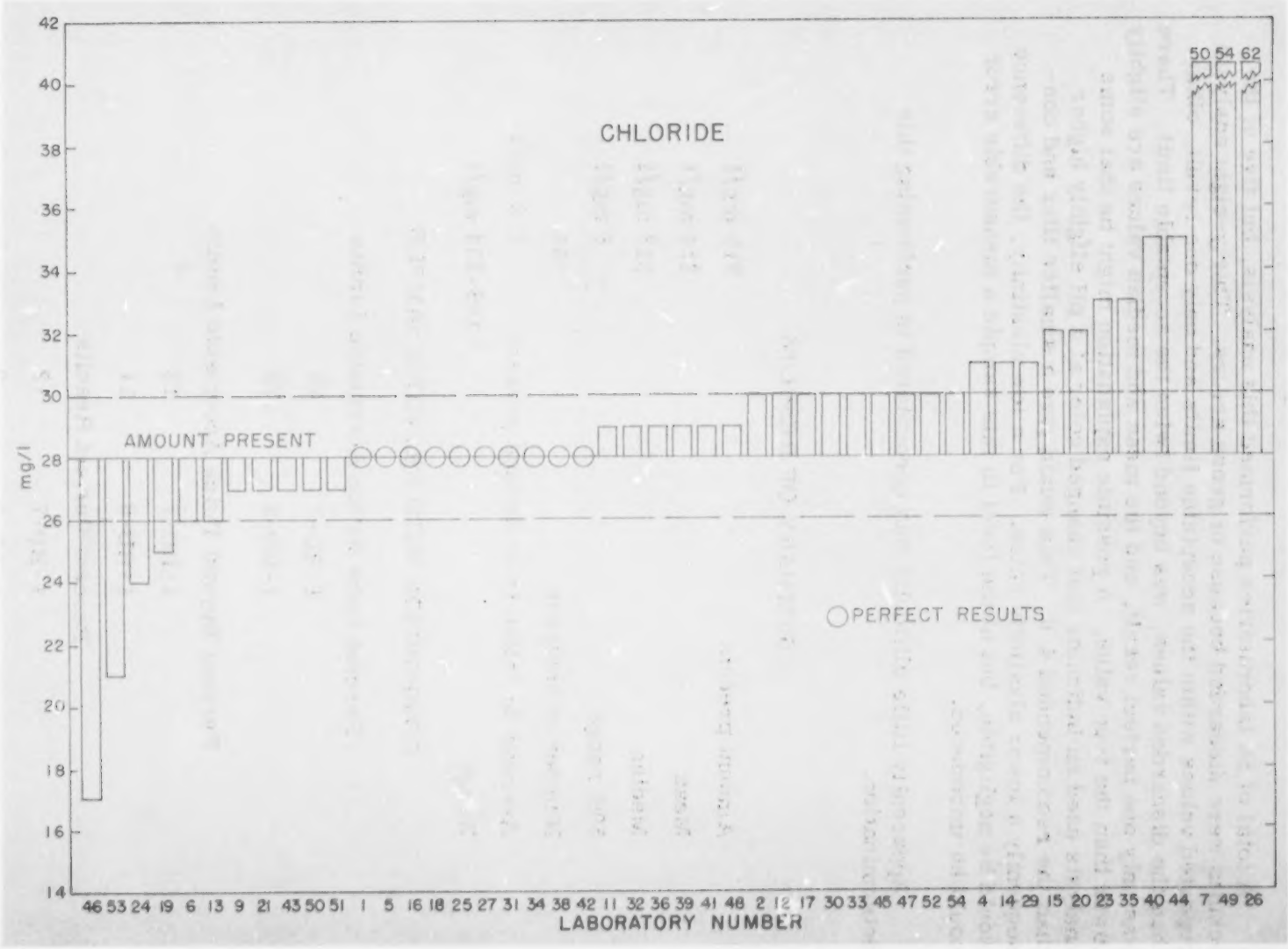
1-BD-7	66
1-BD-8	67

Percent Beyond Twice Acceptable Limits

1-BD-7	19
1-BD-8	19

Percent Perfect Results

1-BD-7	28
1-BD-8	21


CHLORIDE
AMOUNT PRESENT
PERFECT RESULTS
mg/l
42
40
38
36
34
32
30
28
26
24
22
20
18
16
14
50 54 62
46 53 24 19 6 13 9 21 43 50 51 1 5 16 18 25 27 31 34 38 42 11 32 36 39 41 48 2 12 17 30 33 45 47 52 54 4 14 29 15 20 23 35 40 44 7 49 26
LABORATORY NUMBER

TOTAL ALKALINITY - 219 mg/l (as $CaCO_3$)

A total of 54 laboratories performed this analysis, but five of the results were discarded because of gross errors. Thirty-eight analysts reported values within the acceptable limits and only one result, other than the discarded values, was beyond twice the acceptable limit. There was only one perfect result, and the mean and median values are slightly lower than the true value. A possible explanation might be that some analysts used an indicator that changed color at a pH slightly higher than the recommended 4.6. This would give a smaller titer and consequently a lower alkalinity value. For a low alkalinity, the difference would be negligible, but at the level in this sample a measurable error could be introduced.

Apparently little difficulty was encountered in performing this determination.

SUMMARY OF RESULTS

Amount present	219 mg/l
Mean	214 mg/l
Median	213 mg/l
50% range	± 6 mg/l
Number of analyses	54
Average deviation from amount present	7.2 mg/l
Range	195-234 mg/l

COMPARISON WITH PREVIOUS SAMPLE

Percent Labs Within Acceptable Limits

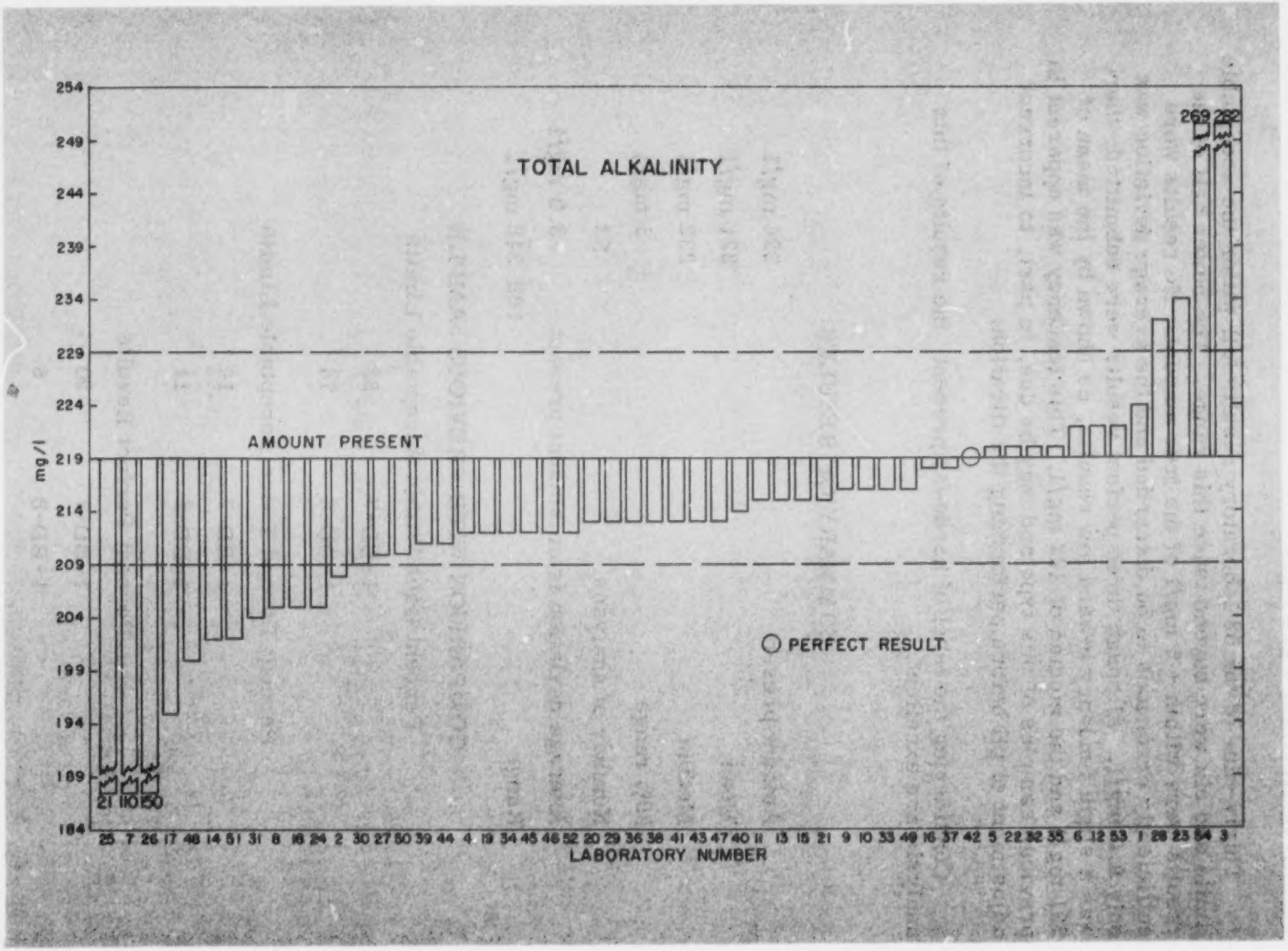
1-BD-7	66
1-BD-8	70

Percent Beyond Twice Acceptable Limits

1-BD-7	12
1-BD-8	11

Percent Perfect Results

1-BD-7	12
1-BD-8	2


TOTAL ALKALINITY
AMOUNT PRESENT
mg/l
254
249
244
239
234
229
224
219
214
209
204
199
194
189
184
269
282
21
110
50
PERFECT RESULT
25 7 26 17 48 14 51 31 8 18 24 2 30 27 50 39 44 4 19 34 45 46 52 20 29 36 38 41 43 47 40 11 13 15 21 9 10 33 49 16 37 42 5 22 32 35 6 12 53 1 28 23 54 3
LABORATORY NUMBER

TOTAL HARDNESS - 224 mg/l

Thirty-nine of the 53 laboratory results fell within the acceptable limits and six were beyond twice this range. The better half of the results were within ± 5 mg/l of the true amount. No results were sufficiently erroneous to be discarded and the average deviation was only 8.0 mg/l. Although three perfect results were submitted, there was a slight tendency toward low results, as shown by the mean of 221 mg/l and the median of 222 mg/l. This tendency was apparent in previous samples of this type and may be due, in part, to incorrect adjustment of pH before performing the titration.

Considering the level of hardness present, the results of this analysis are excellent.

SUMMARY OF RESULTS

Amount present	224 mg/l
Mean	221 mg/l
Median	222 mg/l
50% range	± 5 mg/l
Number of analyses	53
Average deviation from amount present	8.0 mg/l
Range	188-248 mg/l

COMPARISON WITH PREVIOUS SAMPLE

Percent Labs Within Acceptable Limits

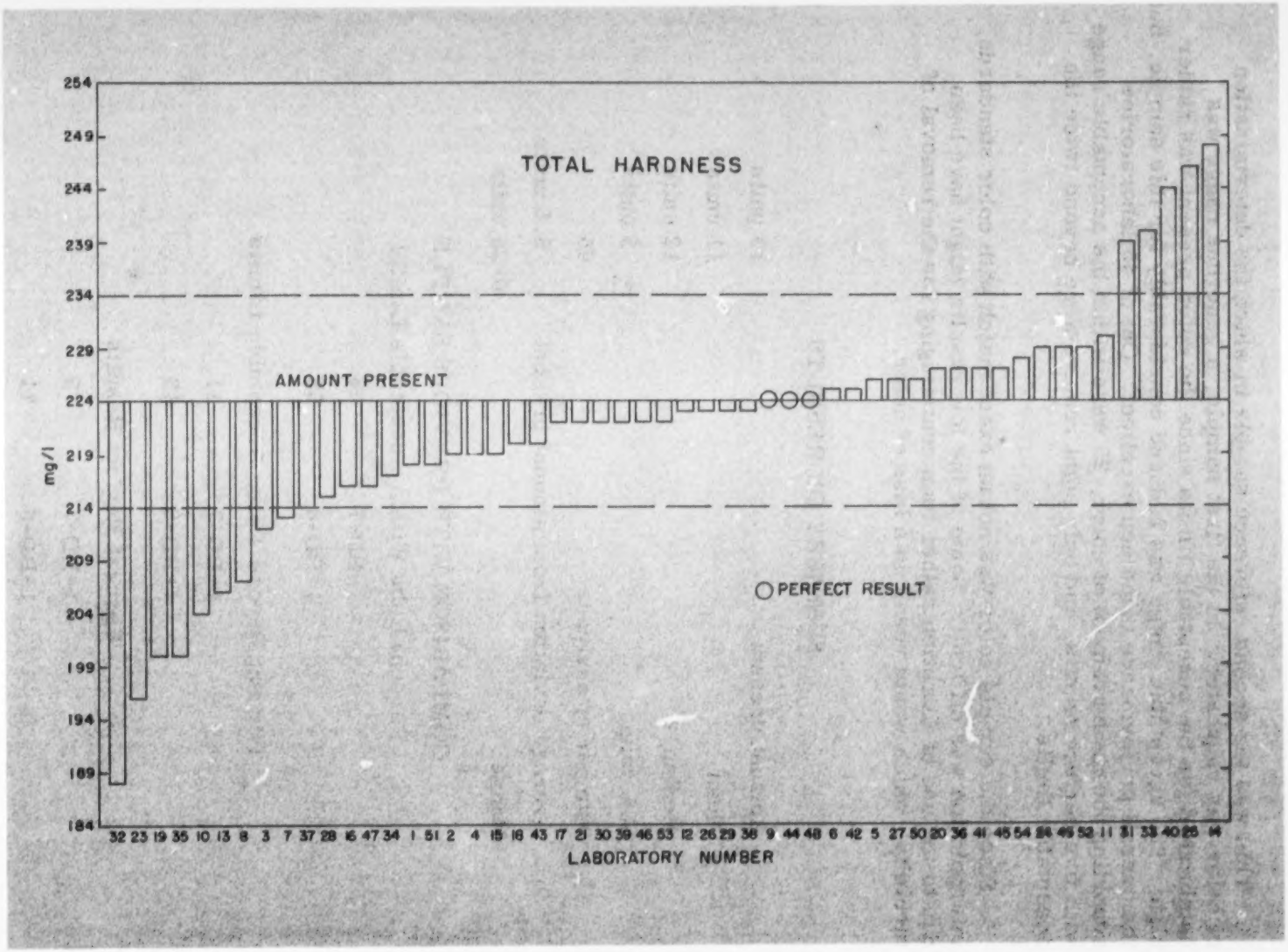
1-BD-7	63
1-BD-8	74

Percent Beyond Twice Acceptable Limits

1-BD-7	19
1-BD-8	11

Percent Perfect Results

1-BD-7	20
1-BD-8	6


TOTAL HARDNESS
AMOUNT PRESENT
mg/l
254
249
244
239
234
229
224
219
214
209
204
199
194
189
184
PERFECT RESULT
32 23 19 35 10 13 8 3 7 37 28 16 47 34 1 51 2 4 15 18 43 17 21 30 39 46 53 12 26 29 38 9 44 48 6 42 5 27 50 20 36 41 45 54 24 49 52 11 31 33 40 25 14
LABORATORY NUMBER

COLOR - 13 Units

This was the second reference sample in which the determination of color was requested. In the first sample, a generous range was established for the acceptable limits since the color present was rather high. The acceptable range was reduced considerably for this sample, but the overall performance remained excellent. Out of 45 laboratories reporting the measurement of color, 25 were within the acceptable range with five perfect results, and only eight results were beyond twice the acceptable limits.

Since the sample color was not an exact match with color standards, interpolation was difficult. Some of the low results might have been due to the use of filtration rather than centrifuging for the removal of turbidity, which would result in a loss of color.

SUMMARY OF RESULTS

Amount present	13 units
Mean	11 units
Median	12 units
50% range	± 5 units
Number of analyses	45
Average deviation from amount present	5.5 units
Range	0-25 units

COMPARISON WITH PREVIOUS SAMPLE

Percent Labs Within Acceptable Limits

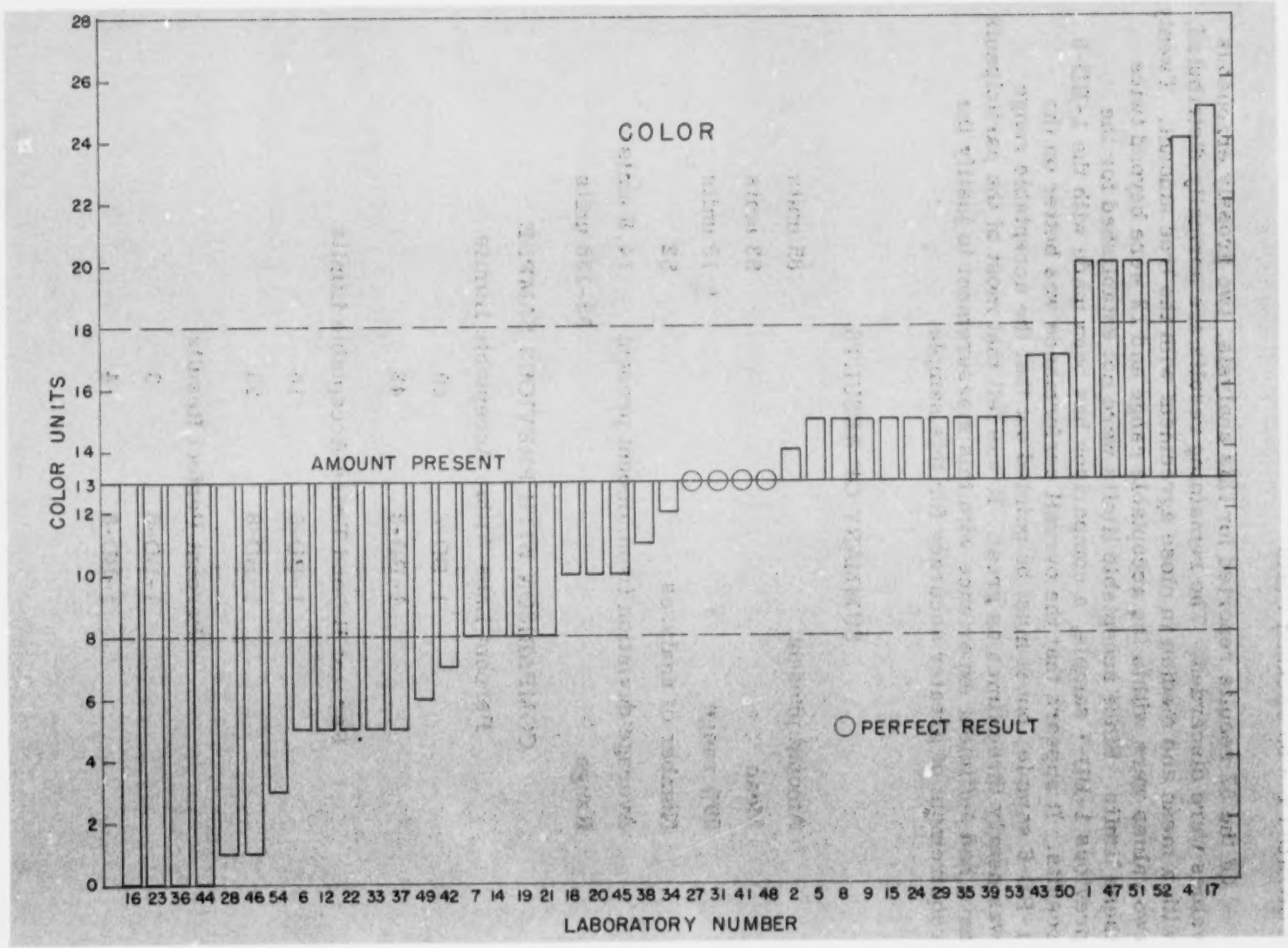
1-BD-7	68
1-BD-8	56

Percent Beyond Twice Acceptable Limits

1-BD-7	11
1-BD-8	18

Percent Perfect Results

1-BD-7	5
1-BD-8	11


COLOR
COLOR UNITS
AMOUNT PRESENT
PERFECT RESULT
LABORATORY NUMBER
0 2 4 6 8 10 12 13 14 16 18 20 22 24 26 28
16 23 36 44 28 46 54 6 12 22 33 37 49 42 7 14 19 21 18 20 45 38 34 27 31 41 48 2 5 8 9 15 24 29 35 39 53 43 50 1 47 51 52 4 17

TURBIDITY - 85 Jackson Units

Of the 52 results reported for this analysis, two grossly erroneous values were discarded. The remaining results are normally distributed, with a mean and median in close agreement with the true amount. Twenty-two values were within the acceptable range and 12 were beyond twice these limits. Since acceptable limits were not established for the previous 1-BD-7 sample, a comparison has been made with the 1-BD-6 results. It appears that the overall performance was better on the 1-BD-6 sample, but it must be pointed out that the acceptable range was nearly three times as great. It was felt that most of the participants have had sufficient experience with this measurement to justify the requirement of greater accuracy for this sample.

SUMMARY OF RESULTS

Amount present	85 units
Mean	83 units
50% range	± 15 units
Number of analyses	52
Average deviation from amount present	14.8 units
Range	55-136 units

COMPARISON WITH PREVIOUS SAMPLE

Percent Labs Within Acceptable Limits

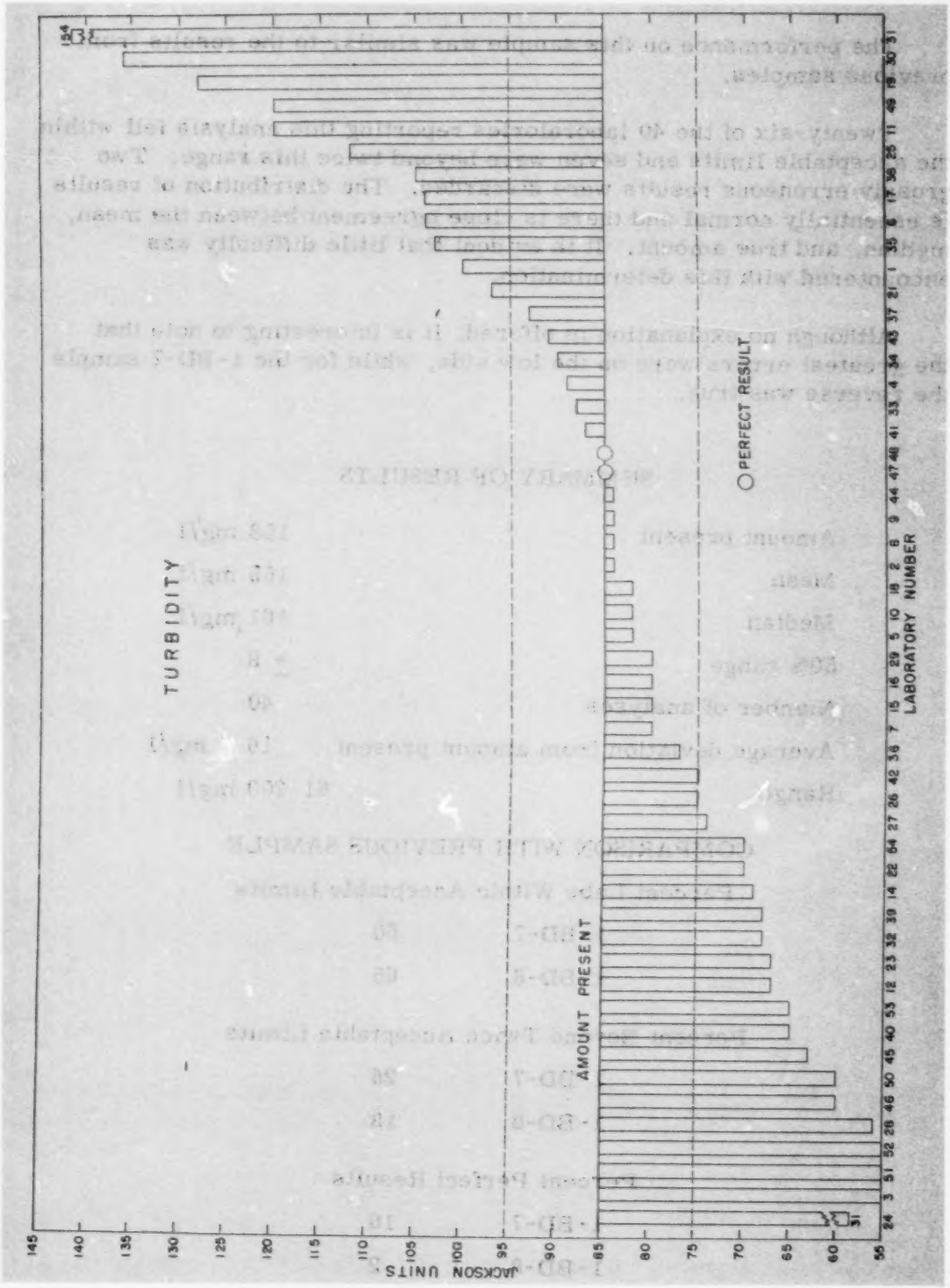
1-BD-6	60
1-BD-8	42

Percent Beyond Twice Acceptable Limits

1-BD-6	16
1-BD-8	23

Percent Perfect Results

1-BD-6	3
1-BD-8	4


TURBIDITY
JACKSON UNITS
AMOUNT PRESENT
PERFECT RESULT
LABORATORY NUMBER

SULFATE - 158 mg/l

The performance on this sample was similar to the results from previous samples.

Twenty-six of the 40 laboratories reporting this analysis fell within the acceptable limits and seven were beyond twice this range. Two grossly erroneous results were discarded. The distribution of results is essentially normal and there is close agreement between the mean, median, and true amount. It is evident that little difficulty was encountered with this determination.

Although no explanation is offered, it is interesting to note that the greatest errors were on the low side, while for the 1-BD-7 sample the reverse was true.

SUMMARY OF RESULTS

Amount present	158 mg/l
Mean	155 mg/l
Median	161 mg/l
50% range	± 8
Number of analyses	40
Average deviation from amount present	16.7 mg/l
Range	61-200 mg/l

COMPARISON WITH PREVIOUS SAMPLE

Percent Labs Within Acceptable Limits

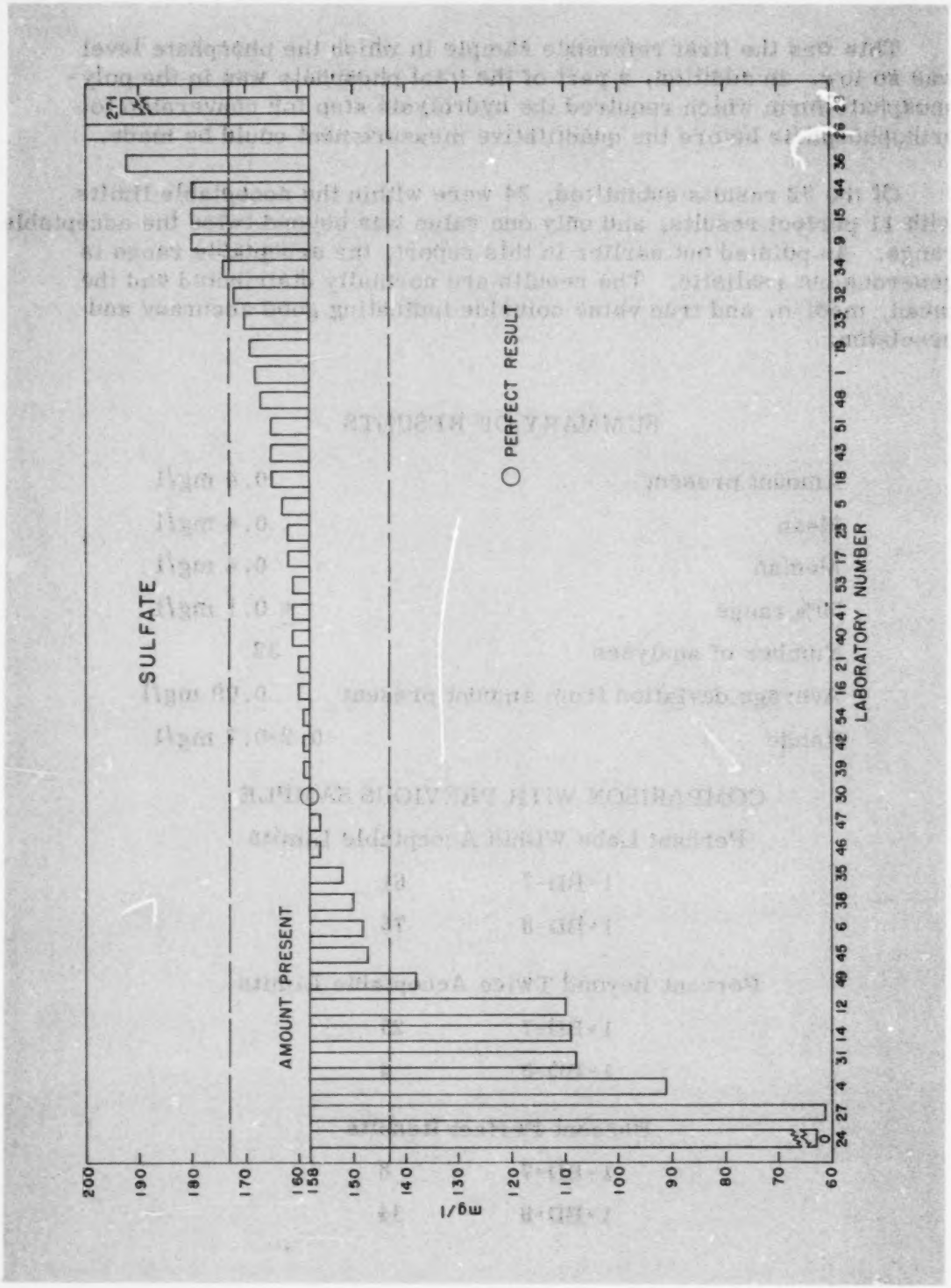
1-BD-7	60
1-BD-8	65

Percent Beyond Twice Acceptable Limits

1-BD-7	26
1-BD-8	18

Percent Perfect Results

1-BD-7	16
1-BD-8	2


SULFATE
AMOUNT PRESENT
PERFECT RESULT
mg/l
LABORATORY NUMBER
271
200
190
180
170
160
158
150
140
130
120
110
100
90
80
70
60
24 27 4 31 14 12 49 45 6 38 35 46 47 30 39 42 54 16 21 40 41 53 17 23 5 18 43 51 48 1 19 33 32 34 9 15 44 36 26 22

TOTAL PHOSPHATE - 0.4 mg/l

This was the first reference sample in which the phosphate level was so low. In addition, a part of the total phosphate was in the polyphosphate form which required the hydrolysis step for conversion to orthophosphate before the quantitative measurement could be made.

Of the 32 results submitted, 24 were within the acceptable limits with 11 perfect results, and only one value was beyond twice the acceptable range. As pointed out earlier in this report, the acceptable range is generous but realistic. The results are normally distributed and the mean, median, and true value coincide indicating good accuracy and precision.

SUMMARY OF RESULTS

Amount present	0.4 mg/l
Mean	0.4 mg/l
Median	0.4 mg/l
50% range	± 0.1 mg/l
Number of analyses	32
Average deviation from amount present	0.09 mg/l
Range	0.2-0.7 mg/l

COMPARISON WITH PREVIOUS SAMPLE

Percent Labs Within Acceptable Limits

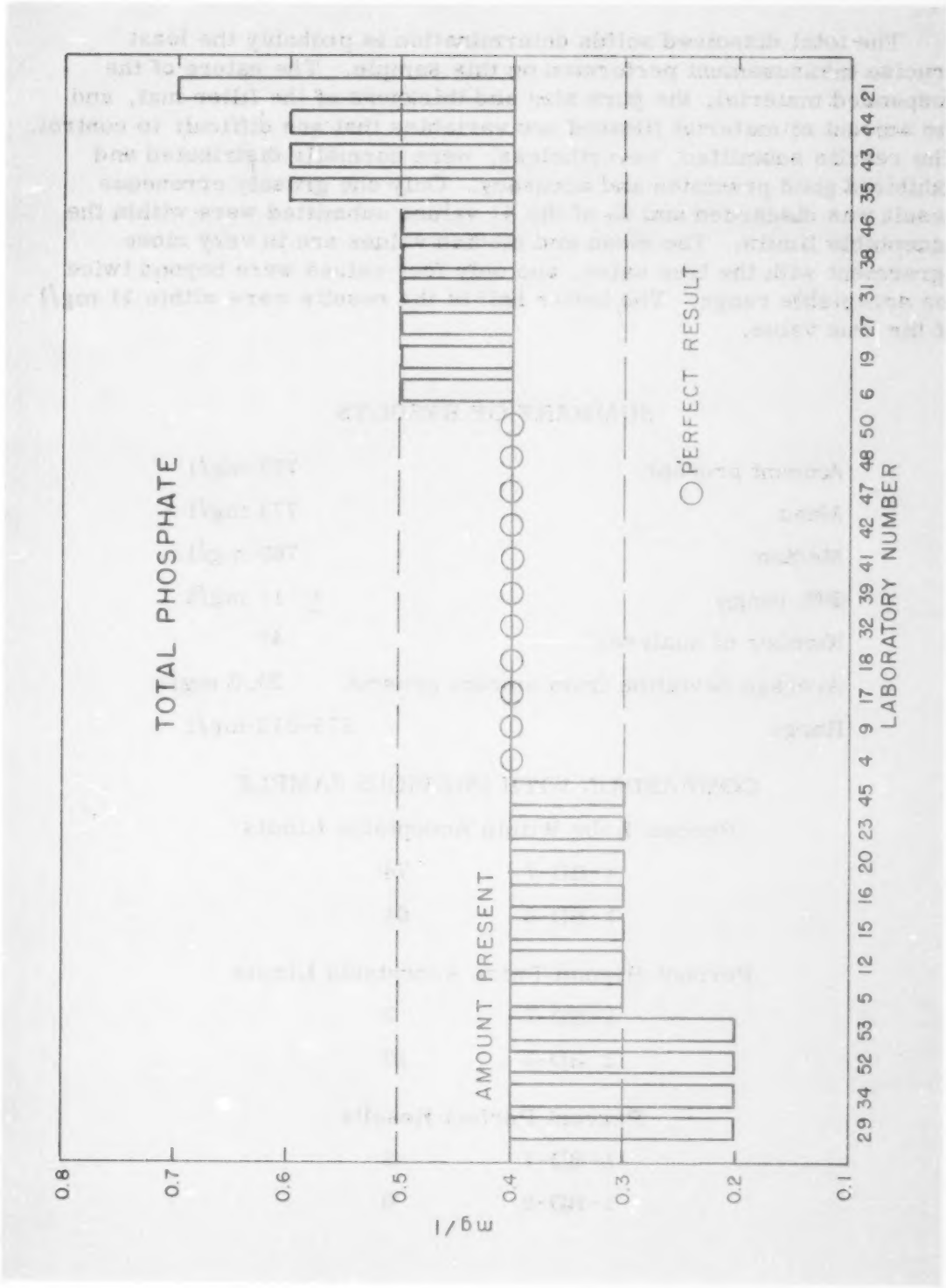
1-BD-7	61
1-BD-8	75

Percent Beyond Twice Acceptable Limits

1-BD-7	25
1-BD-8	3

Percent Perfect Results

1-BD-7	8
1-BD-8	34


TOTAL PHOSPHATE
AMOUNT PRESENT
PERFECT RESULT
mg/l
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
29 34 52 53 5 12 15 16 20 23 45 4 9 17 18 32 39 41 42 47 48 50 6 19 27 31 38 46 35 43 44 21
LABORATORY NUMBER

T. D. S. - 776 mg/l

The total dissolved solids determination is probably the least precise measurement performed on this sample. The nature of the suspended material, the pore size and thickness of the filter mat, and the amount of material filtered are variables that are difficult to control. The results submitted, nevertheless, were normally distributed and exhibited good precision and accuracy. Only one grossly erroneous result was discarded and 25 of the 41 values submitted were within the acceptable limits. The mean and median values are in very close agreement with the true value, and only four values were beyond twice the acceptable range. The better half of the results were within 11 mg/l of the true value.

SUMMARY OF RESULTS

Amount present	776 mg/l
Mean	774 mg/l
Median	780 mg/l
50% range	± 11 mg/l
Number of analyses	41
Average deviation from amount present	20.0 mg/l
Range	675-813 mg/l

COMPARISON WITH PREVIOUS SAMPLE

Percent Labs Within Acceptable Limits

1-BD-7	74
1-BD-8	61

Percent Beyond Twice Acceptable Limits

1-BD-7	7
1-BD-8	10

Percent Perfect Results

1-BD-7	6
1-BD-8	0

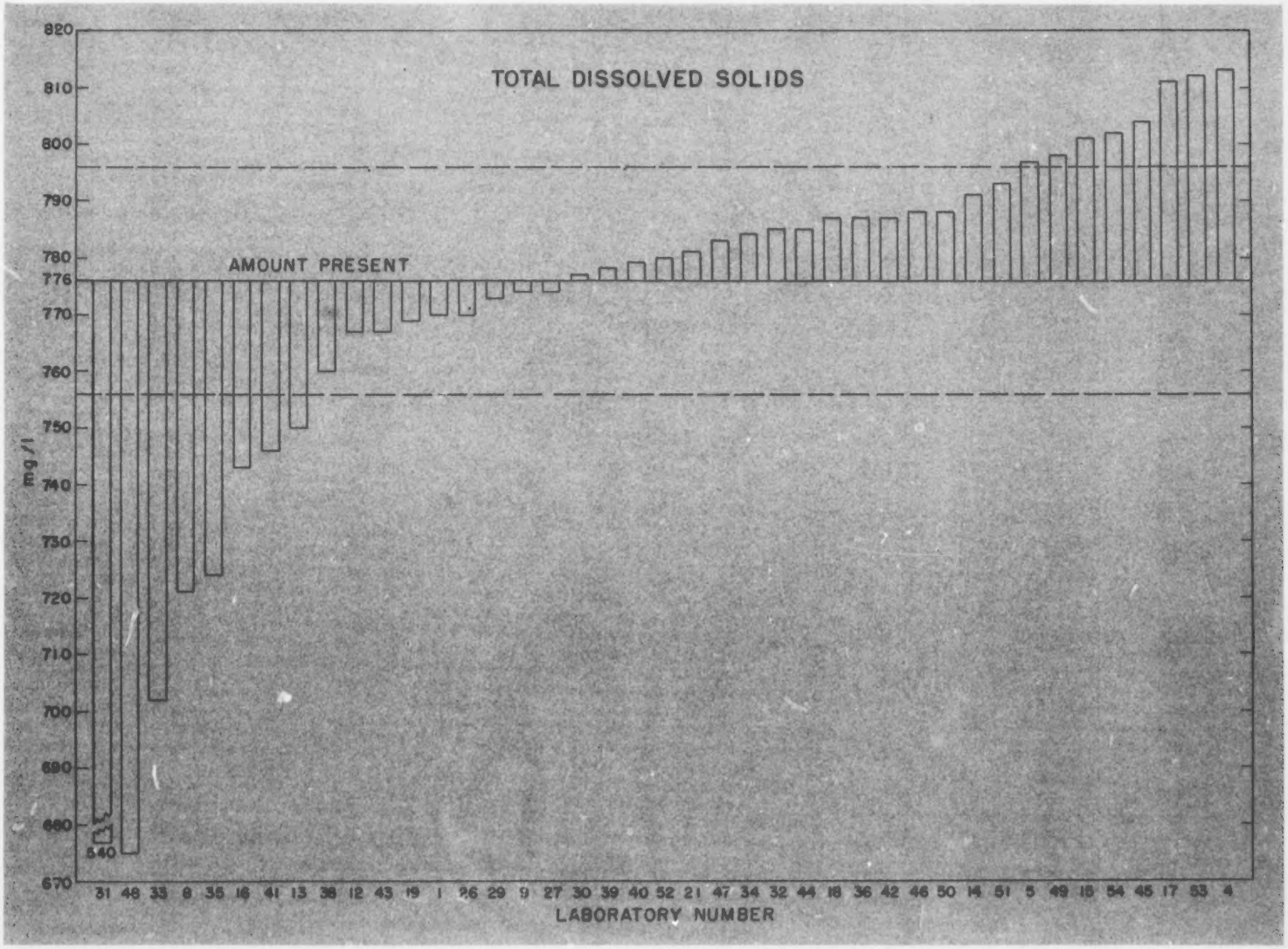

TOTAL DISSOLVED SOLIDS
AMOUNT PRESENT
mg/l
820
810
800
790
780
776
770
760
750
740
730
720
710
700
690
680
670
540
31 48 33 8 35 16 41 13 38 12 43 19 1 26 29 9 27 30 39 40 52 21 47 34 32 44 18 36 42 46 50 14 51 5 49 18 54 45 17 53 4
LABORATORY NUMBER

Table 2. SUMMARY OF RESULTS

REFERENCE SAMPLE TYPE 1, BD-8

Analyses performed	Chloride	Alkalinity	Hardness	Color	Turbidity	Sulfate	Phosphate	T.D.S.
Amount present	28 mg/l	219 mg/l	224 mg/l	13 units	85 units	158 mg/l	0.4 mg/l	776 mg/l
Laboratory number	Average Amount Reported by Each Laboratory							
1	28	224	218	20	100	168	--	770
2	30	208	219	14	84	--	--	--
3	--	282	212	--	55	--	--	--
4	31	212	219	24	89	91	0.4	813
5	28	220	226	15	82	163	0.3	797
6	26	222	225	5	104	148	0.5	--
7	50	110	213	8	80	--	--	--
8	--	205	207	15	84	--	--	721
9	27	216	224	15	84	180	0.4	774
10	--	216	204	--	82	--	--	--
11	29	215	230	--	120	--	--	--
12	30	222	223	< 5	67	110	0.3	767
13	26	215	206	--	--	--	--	750
14	31	202	248	8	69	109	--	791
15	32	215	219	15	80	180	0.3	801

Analyses performed	Chloride	Alkalinity	Hardness	Color	Turbidity	Sulfate	Phosphate	T.D.S.
Amount present	28 mg/l	219 mg/l	224 mg/l	13 units	85 units	158 mg/l	0.4 mg/l	776 mg/l
Laboratory number	Average Amount Reported by Each Laboratory							
16	28	218	216	0	80	160	0.3	743
17	30	195	222	25	104	162	0.4	811
18	28	205	220	10	82	165	0.4	787
19	25	212	200	8	128	169	0.5	769
20	32	213	227	10	--	--	0.3	--
21	27	215	222	8	97	160	0.7	781
22	--	220	--	5	70	--	--	--
23	33	234	196	0	67	162	0.3	--
24	24	205	229	15	31	0	--	--
25	28	21	246	--	112	--	--	--
26	62	150	223	--	75	200	--	770
27	28	210	226	13	74	61	0.5	774
28	--	232	215	1	56	--	--	--
29	31	213	223	15	80	271	0.2	773
30	30	209	222	--	136	158	--	777

Analyses performed	Chloride	Alkalinity	Hardness	Color	Turbidity	Sulfate	Phosphate	T.D.S.
Amount present	28 mg/l	219 mg/l	224 mg/l	13 units	85 units	158 mg/l	0.4 mg/l	776 mg/l
Laboratory number	Average Amount Reported by Each Laboratory							
31	28	204	239	13	154	108	0.5	540
32	29	220	188	--	68	172	0.4	785
33	30	216	240	5	88	170	--	702
34	28	212	217	12	90	174	0.2	784
35	33	220	200	15	103	152	0.6	724
36	29	213	227	0	77	192	--	787
37	--	218	214	5	93	--	--	--
38	28	213	223	11	105	150	0.5	760
39	29	211	222	15	68	159	0.4	778
40	35	214	244	--	65	161	--	779
41	29	213	227	13	87	161	0.4	746
42	28	219	225	7	75	159	0.4	787
43	27	213	220	17	91	165	0.6	767
44	35	211	224	0	84	180	0.3	785
45	30	212	227	10	63	147	0.3	804

Analyses performed	Chloride	Alkalinity	Hardness	Color	Turbidity	Sulfate	Phosphate	T.D.S.
Amount present	28 mg/l	219 mg/l	224 mg/l	13 units	85 units	158 mg/l	0.4 mg/l	776 mg/l
Laboratory number	Average Amount Reported by Each Laboratory							
46	17	212	222	1	60	156	0.5	788
47	30	213	216	20	85	156	0.4	783
48	29	200	224	13	85	167	0.4	675
49	54	216	229	6	120	138	--	798
50	27	210	226	17	60	--	0.4	788
51	27	202	218	20	55	165	--	793
52	30	212	229	20	55	--	0.2	780
53	21	222	222	15	65	161	0.2	812
54	30	269	228	3	70	159	--	802
Mean	29[1]	214[2]	221	11	83[3]	155[4]	0.4	774[5]
Median	29	213	222	12	82	161	0.4	780
Range	17-35	195-234	188-248	0-25	55-136	61-200	0.2-0.7	675-813

1 Results from Labs #7, 49, 26, discarded.
2 Results from Labs #25, 7, 26, 54, 3, discarded.
3 Results from Labs #24, 31, discarded.
4 Results from Labs #24, 29, discarded.
5 Result from Lab #31 discarded.